

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY TRAINING AND DOCTRINE COMMAND
Fort Monroe, Virginia 23651-5000

TRADOC Regulation
No. 350-29

31 December 1987

Training
PREVENTION OF HEAT AND COLD CASUALTIES

Supplementation of this regulation is permitted.
However, proposed supplements must be submitted
to HQ TRADOC, ATTN: ATTG-I, for approval.

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1. Purpose. To prescribe policy and provide guidance to assist commanders in preventing heat and cold injuries.

2. Applicability. This regulation applies to all Active Component (AC) and Reserve Component (RC) training conducted at service schools, Army training centers (ATC), or other training activities under the control of HQ TRADOC,

3. Responsibility. Commanders and supervisors at all levels are responsible for protecting soldiers and civilian personnel from heat and cold injury,

4. General. Extremes in weather conditions pose additional problems to our training efforts and increase the risk of heat and cold injury, Successfully preventing climatic casualties depends largely on educating personnel and applying methods to reduce exposure. Additionally, to prevent heat and cold

injuries, commanders must develop procedures to alert individuals of heat stress and windchill conditions and adopt techniques to reduce the susceptibility of personnel to climatic injury.

5. Recognition and treatment. Commanders and supervisors must ensure every individual who may be exposed to unaccustomed environmental conditions is informed of the potentially serious results of climatic injuries and how to recognize and treat those injuries if they occur. The U.S. Army Training and Audiovisual Support Center (TASC) has available for use pocket-size guides for identification, first aid treatment, and preventive measures for heat (GTA 8-5-45 (appendix A)) and cold (GTA 8-6-12 (appendix B)) injuries.

a. Heat injuries that commanders should be particularly concerned with include heat cramps, heat exhaustion, and heat stroke. The symptoms and treatments for these heat injuries are listed below.

(1) Heat cramps. Heat cramps result primarily from excessive loss of salt from the body. This condition occurs when individuals who have been actively sweating don't replace the salt lost in their sweat.

(a) Symptoms. Painful contraction of muscles (normally the extremities and abdominal muscles). Body temperature is normal unless heat cramps are accompanied by heat exhaustion.

(b) Treatment. Heat cramps are promptly relieved by replacing the salt lost from the body. Move victims to a shaded area, loosen their clothing, and make them slowly drink at least one canteen of salted water (1/4 teaspoon of salt per quart of water). If salt is not available, use plain water.

(2) Heat exhaustion. Heat exhaustion occurs as a result of excessive loss of water and salt from the body.

(a) Symptoms. Profuse sweating, headache, tingling sensations, paleness of skin, shortness of breath, palpitations, trembling, nausea, and vomiting. The skin will be moist and cool; the pulse will be rapid; and the body temperature will be normal or slightly below normal. Individuals with heat exhaustion may also act slightly confused or may momentarily lose consciousness.

(b) Treatment. Move victims of heat exhaustion to a shaded area, loosen their clothing, and elevate their feet to promote the return of blood to their heart. Make them drink at least one canteen of salted water (1/4 teaspoon of salt per quart of water). Recovery is usually prompt. However, individuals suffering from heat exhaustion will be assigned to light duty for 24 to 48 hours following their recovery.

(3) Heat stroke. HEAT STROKE IS A MEDICAL EMERGENCY WITH A HIGH MORTALITY RATE. This condition, caused by overexposure to the sun or heat, results from a breakdown of the body's ability to control its temperature.

(a) Symptoms. Extremely high body temperature, sudden loss of consciousness, convulsions, delirium, headache, dizziness, weakness, and nausea. Sweating is absent in the typical case, and the skin is hot, dry, and flushed. Pulse and respiration are rapid.

(b) Treatment. Lowering the victim's body temperature as rapidly as possible is the most important objective in the treatment of heat strokes. Remove the patient's clothes, and, if any source of cool water or ice is nearby, immerse the victim in it. Otherwise, sprinkle water over the patient and fan the patient to hasten the water evaporation. Transport victims of heat stroke to the nearest medical facility as soon as possible. While awaiting transportation, keep patients in the shade with their feet elevated. If they are conscious, make them drink at least one canteen of salted water (1/4 teaspoon of salt per quart of water). Continue efforts to reduce body temperature while transporting victims.

b. Cold injuries are classified as nonfreezing (trench/immersion foot/ and hypothermia) and freezing (frostbite). Symptoms and treatments for cold injuries are listed below.

(1) Trench/immersion foot. Immersion foot or trench foot is an injury that results from fairly long exposure of the feet to wet conditions at temperatures from approximately 50 to 32 degrees fahrenheit. Inactive feet in wet socks and boots or tightly laced boots impair circulation and are even more susceptible to injury. Prolonged exposure can cause the feet to swell. Pressure closes blood vessels, cuts off circulation, and can lead to loss of parts of the feet.

(a) Symptoms. Feet are cold and reddish in color and have swelling, blistering, bleeding, and numbness.

(b) Treatment. Individuals with immersion injury should elevate and rewarm their feet gradually by exposing them to warm air. Do not moisten, massage, or apply heat or ice to feet with immersion injuries. Covering the patient with several layers of warm coverings is preferable to using extreme heat. Evacuate patients as soon as possible.

(2) Hypothermia. Hypothermia is a state in which core body temperatures of individuals are below normal because they are losing heat faster than they can produce it. General cooling of the entire body to a temperature below 95 degrees fahrenheit is caused by continued exposure to low or rapidly dropping temperatures, cold moisture, snow, or ice.

(a) Symptoms. As the body cools, the following progressive

stages of discomfort and impairment occur: shivering; faint pulse; mental confusion; slurred speech; glossy eyes; slow, shallow breathing; uncoordinated movements; unconsciousness; and irregular heart beat.

(b) Treatment. Since hypothermia is a medical emergency, prompt medical treatment is necessary. The victim's body must be rewarmed with an external heat source since the victim can't generate heat. Perform cardiopulmonary resuscitation (CPR), if necessary, and keep the victim dry and protected from the elements. Evacuate the victim as soon as possible.

(3) Frostbite. Frostbite is the injury to tissue caused from exposure to below freezing temperatures. Severe frostbite can result in loss of affected body parts such as fingers, toes, hands, or feet.

(a) Symptoms. Frostbite starts with a discoloration of the skin of the nose, ears, cheeks, fingers, or toes. This is followed by a tingling sensation for a short time and then numbness. The skin may briefly appear red for light skinned individuals or greyish for dark skinned individuals and then become pale or waxy white. Upon thawing, the signs vary with the degree of injury. Mild to moderate frostbite injury appears red and swollen, has blisters, and is painful. Severe frostbite injuries have blue-black discoloration, blood filled blisters, and an absence of pain.

(b) Treatment. Remove tight clothing or boots from the injured area. Warm the frozen body part by placing it next to the skin of another person. Keep the victim warm and covered to prevent further injury. Do not massage, expose to open fire, rub with snow, or soak injuries in cold water. Evacuate the victim to a medical treatment facility as soon as possible.

6. Heat injury prevention.

a. Reference 10e contains a comprehensive discussion of heat casualty prevention. Commanders, cadre, and other responsible officers and non-commissioned officers (NCO) must be able to identify environmental conditions under which adverse effects of heat are likely to occur. The Wet Bulb Globe Temperature (WBGT) Index and the Wet Globe Thermometer (WGT) are the best means of evaluating the degree of heat stress imposed by all environments. Commanders must use at least one of these indexes during all operations in heat and take measurements in a location which is the same as, or closely approximates, the environment to which personnel are exposed.

b. Heat conditions are classified by color (green, yellow, red, and black; in increasing order of heat stress according to Botsball (WGT) and WBGT readings. Commanders must adapt training/physical activity and uniform requirements to conform with the precautions for each heat condition listed on next page.

HEAT	BOTSBALL (WGT)	WBGT	WATER INTAKE	**ACCLI- MATIZED
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CONDITION	INDEX F	INDEX F	QTS/HR	WORK/REST	UNACCLIMATIZED
*	<80	<82	1/2	50/10	Use caution in planning extremely intense physical exertion.
GREEN	80-82.9	82-84.9	1/2 to 1	50/10	Use discretion in planning heavy exercise.
YELLOW	83-85.9	85-87.9	1 to 1 ½	45/15	Suspend strenuous exercise during the first 3 weeks of training. Activities may be continued on a reduced scale after the 2d week. Avoid activity in the direct sun.
RED	86-87.9	88-89.9	1 1/2 to 2	30/30	Curtail strenuous exercise for all personnel with less than 12 weeks of hot weather training.
BLACK	88 & up	90 & up	>2	20/40	Suspend physical training and strenuous exercise. Essential operational commitments (e.g., guard duty) will not be suspended.

* Mission Oriented Protective Posture (MOPP) or body armor adds 10 degrees fahrenheit to the Botsball or WBGT index.

** An acclimatized soldier is one who has had progressive degrees of heat exposure and physical exertion for about 2 weeks. These work/rest periods do not apply to soldiers in MOPP gear or body armor.

c. The following actions, if emphasized by the commander, will reduce the risk of heat injury:

(1) Training. Give classes on heat injury recognition, treatment, and preventive measures annually to cadre and to soldiers in training. These classes will stress the causes of heat injury, the potentially serious result, first aid treatments, and the importance of water consumption in preventing heat injury. Briefings for commanders and supervisors will also include discussions on the following topics:

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(a) Past experience with heat injury at the installation.

(b) The need for acclimatization and careful scheduling of

physical activities.

(c) The recognition of personnel who are at increased risk of heat injury (e.g., those with prior heat injury, current illness, recent immunization, obesity, and those who take medication).

(d) Use of the WBGT and WGT indexes.

(2) Use of the buddy system. Soldiers do not always recognize or react to their own early symptoms of heat injuries. They must be taught to observe their buddies for evidence of heat stress.

(3) Acclimatization to heat. Acclimatization is acquired by working in hot environments for gradually increasing periods of time on a daily basis over a period of about 2 weeks. Schedule training programs to provide for increasingly longer periods with alternating rest periods for personnel who are climatically unseasoned to heat. Commanders must take advantage of the cooler hours of the day when it is necessary to accomplish work during the acclimatization period.

(4) Water intake. Adequate water intake is the single most important factor in avoiding heat injury. An individual subjected to high heat stress may, through sweating, lose water in excess of one quart per hour. Water loss must be replaced, preferably by periodic intake of small amounts of water throughout the work period. Thirst is not an adequate stimulus for water intake. Therefore, commanders must require soldiers to drink water to prevent dehydration. Commanders must enforce an unlimited water drinking policy, particularly during times of increased physical stress.

(5) Salt replacement. In addition to water, sodium chloride is lost in sweating. While the diet ordinarily contains an adequate amount of salt, additional salt may be provided cautiously during the first few days of exposure to heat, especially in the case of unacclimatized individuals. Salt loss tends to be greater during acclimatization than after acclimatization. Using extra salt in cooking and on the plate will meet most requirements. Avoid excessive intake of salt, since it may cause increased thirst and incapacitating nausea.

(6) Scheduling work/training. Commanders must schedule activities to fit the climate, the physical condition of personnel, and the military situation. Schedule intense physical activity during the cooler hours of the day and avoid scheduling work in direct sunlight on hot days when possible. Commanders must closely supervise their soldiers to complete training requirements with minimum hazard.

(7) Physical conditioning. The general physical condition of the individual has a significant bearing on the reaction to heat stress. The risk

of heat injury is much higher in overweight, unfit persons than in those of normal weight. Commanders must exercise special care where such persons are exposed to high temperatures. Since one attack of either heat stroke or severe heat exhaustion may predispose to a second, commanders must identify individuals who have experienced previous heat injury and exercise caution in exposing them to subsequent heat stress.

(8) Clothing. Clothing reduces the exposure of the body surface to solar radiation; however, at the same time, it decreases the movement of air over the skin. To take full advantage of its benefits and minimize its disadvantages, clothing should be loose fitting, especially at the neck and wrists. Commanders may authorize exceptions to the prescribed wear of the Battle Dress Uniform (BDU) to protect troops and maintain efficiency. During heat condition "yellow," commanders will have soldiers unblouse trousers during strenuous physical activity or exposure to heat. Commanders will require soldiers to remove their jackets during strenuous physical activity or exposure to heat in heat categories "red" and "black." However, commanders must avoid exposing soldiers to intense solar radiation for extended periods of time (>1 hour).

d. Do not use water sprays to cool down soldiers in training (except as a first aid treatment for heat stroke casualties). This does not prevent heat injuries. The temporary cooling effect achieved through spraying may in fact increase core body temperature and intensify heat injuries.

7. Cold injury prevention.

a. Prior planning and adequate training are essential to minimize cold injury casualties. Reference 10d contains a detailed discussion on proper measures for preventing cold injuries. Commanders, cadre, and other responsible officers and NCOs must be familiar with environmental conditions (such as temperature, wind, humidity, and ground surface conditions) that influence the risk of cold injury. They should know how to use the wind chill chart in table 1 of reference 10d. A pocket size wind chill card (GTA 8-5-40 (appendix C)) is available for use through TASC.

b. Commanders must establish appropriate guidelines on training/physical activity, uniform wear, and troop support requirements to conform with the precautions for each wind chill level listed below.

WIND CHILL (Degrees Fahrenheit)

PRECAUTIONS

30 and below

Alert personnel to the potential for cold injury.

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WIND CHILL (Degrees Fahrenheit)

PRECAUTIONS

25 and below

Leaders inspect personnel for wear of cold weather clothing.

	Provide warm-up tents/areas and hot beverages.
0 and below	Leaders inspect personnel for cold injuries and emphasize that buddies must also check each other.
	Increase the frequency of rotating soldiers exposed to wind chill conditions to warming area.
-20 and below	Curtail all but mission essential operations where soldiers are exposed to wind chill conditions.

c. Effective cold injury prevention programs must include the following:

(1) Training. Give classes on cold injury recognition, first aid, and preventive measures annually to all cadre and soldiers in training.

(2) Use of the buddy system. Soldiers do not always recognize or react to their own early symptoms of cold injuries. They must be taught to observe their buddies for evidence of overexposure to cold.

(3) Clothing. The chain of command must ensure that soldiers are issued serviceable, properly fitting clothing and footgear for cold weather. Additionally, commanders must emphasize that preventing cold injuries depends on wearing clothing properly. Soldiers should be encouraged to wear as little as possible, consistent with the weather. (It is better for the body to be slightly cold and generating heat than excessively warm.) Clothing should be clean, dry, loose fitting, and worn in layers. Layering clothing provides layers of air to insulate the body and permits good circulation of the blood. Dirty clothes conduct heat more rapidly and afford less protection from the cold. Moisture causes clothing and footgear to lose their insulating qualities. Encourage soldiers to remove some layers when they are exposed to heat or performing any physical activity to prevent perspiration and subsequent chilling.

(4) Scheduling work/training. Commanders must tailor schedules to fit weather conditions by scheduling activities requiring exposure to cold as the wind chill factor increases and frequently providing warm-up breaks.

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(5) Physical conditioning. The general physical condition of soldiers has a significant bearing on their susceptibility to cold injury.. Physical fatigue contributes to apathy, inactivity, personal neglect, and carelessness. These lead to loss of heat production and retention and increase the risk of cold injury. Soldiers with prior cold injuries have a higher than normal risk of subsequent cold injuries. Commanders must ensure soldiers maintain their

self-discipline in cold weather to protect themselves from cold injury, Additionally, commanders must identify soldiers with previous cold injuries and exercise caution in exposing them to hazardous wind chill conditions.

(6) Exercise. Commanders must encourage physical activity in cold weather, Activity of large muscle groups of the shoulders, trunk, and legs is required in order to generate and maintain body heat. When the situation prohibits such gross activities, frequent changes of positions; moving toes, feet, legs, fingers, arms, and hands; and, to a lesser extent, isometric contractions are less satisfactory alternatives. In such situations, some delay in heat loss can be accomplished by sitting or standing on insulating material rather than on cold or wet ground.

8. Evacuation. Commanders must establish a liberal policy of evacuation of injured personnel to the nearest medical treatment facility.

9. Reporting. In accordance with AR 40-400, commanders will use the Special Telegraphic Report RCS MED-16(R4) to report all heat and cold injuries requiring hospital admission or any significant clusters of heat or cold injuries that occur in one unit that do not require hospitalization. Commanders must furnish a copy of this report to Commander, TRADOC, ATTN: ATMD, Fort Monroe, VA 23651-5000.

10 . References.

- a. Army Regulation 40-5, 1 Jun 85, Preventive Medicine.
- b. Field Manual 21-10, 22 Dec 83, Field Hygiene and Sanitation.
- c. Field Manual 21-11, 7 Oct 85, First Aid for Soldiers.
- d. TB Med 81, 30 Sep 76, Cold Injury.
- e. TB Med 507, 25 Jul 80, Occupational and Environmental Health: Prevention, Treatment, and Control of Heat Injury.
- f. TRADOC Regulation 350-6, 13 Feb 87, Initial Entry Training Policies and Administration, 13 Feb 87.

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APPENDIX A

SAMPLE HEAT INJURY PREVENTION CARD

HEAT CRAMPS

BASIC HEAT INJURY PREVENTION

SYMPTOMS

Muscle cramps of the abdomen, legs or arms.

FIRST AID

1. Move the soldier to a shaded area and loosen clothing.
2. Dissolve ¼ teaspoon table salt in a (one quart) canteen of water. Have soldier slowly drink at least one canteen of this salt solution. If no salt is available, use plain water. **DO NOT USE ADDITIONAL SALT.**

1. Consider water a tactical weapon. Reduce heat injury by forcing water consumption.
2. When possible, provide cooled water (50F to 60F) to enhance its taste and increase voluntary water consumption.
3. Drink one quart of water in the morning, at each meal, and before and during hard or strenuous work.
4. Take frequent drinks since they are more effective than drinking the same amount all at once. Larger soldiers need more water.
5. The use of salt tablets for replacement of salt lost through sweating is not recommended. An adequate salt intake is best achieved by eating three salt-seasoned meals per day.
6. When possible, schedule heavy workloads for the cooler hours of the day such as early morning or late evening.
7. Give frequent rest periods. Lower the workrate and workloads as the heat condition increases.
8. When possible, workloads and/or duration of physical exertion should be less during the first days of exposure to heat: then they should be gradually increase to allow acclimatization.

HEAT EXHAUSTION

SYMPTOMS

Profuse sweating with pale, moist and cool skin, headaches, weakness, loss of appetite, dizziness. May also have heat cramps, nausea, urge to defecate, chills, rapid breathing, tingling of the hands or feet and confusion.

FIRST AID

1. Move soldier to a shaded area, loosen or remove clothing; elevate legs, pour on water and fan if it is very hot.
2. Dissolve ¼ teaspoon table salt in a (one quart) canteen of water. Have the soldier slowly drink at least one canteen of this salt solution. If no salt is available, use plain water. **DO NOT USE ADDITIONAL SALT.**

HEATSTROKE

SYMPTOMS

Headache, dizziness, stomach pains, confusion, weakness, may Suddenly lose consciousness, and may have seizures; skin is hot and may be dry; pulse and respiration are rapid and weak. Heatstroke is a medical emergency.

FIRST AID

1. Immerse in water or pour water on and fan.
2. Transport to the nearest medical treatment facility at once.
3. While awaiting or during transport move to a shaded area, remove clothing and boots, elevate legs; continue pouring on water and fanning; massage the skin. If conscious, have him drink the salt water as described under Heat Exhaustion. **DO NOT USE ADDITIONAL SALT.**

APPENDIX B

SAMPLE COLD INJURY PREVENTION CARD

GTA 8-6-12
AUGUST 1985

ADVERSE EFFECTS OF COLD CAUSE AND SYMPTOMS

FREEZING INJURY (FROSTBITE).

- a. Cause: EXPOSURE TO BELOW FREEZING TEMPERATURES,

COMMONLY ASSOCIATED WITH DAMP CLOTHING OVER THE INVOLVED BODY PART.

b. Symptoms: Skin is waxy, white/gray and numb while frozen. Upon thawing, the signs vary with the degree of injury as follows:

1. Mild-Moderate: Redness, swelling, clear blisters, pain.
2. Severe: Blue-black discoloration, blood-filled blisters, early absence of pain.

NONFREEZING ("TRENCH FOOT," "IMMERSION FOOT").

a. Cause: PROLONGED EXPOSURE TO COLD (USUALLY 32o -50o F) AND WETNESS.

b. Symptoms: Redness, swelling, blistering, bleeding, numbness.

SEE REVERSE FOR PREVENTION AND FIRST AID

HEADQUARTERS, DEPARTMENT OF THE ARMY

PREVENTION

TO KEEP WARM REMEMBER THE WORD C-O-L-D

C -- Cleanliness and Care – Feet, socks, and clothing are warmer when clean. Proper care of the feet is imperative.

O -- Overheating – Wearing too much clothing causes overheating, perspiration, dampness and coldness.

L -- Layers and Looseness – Clothing in loose layers assures air spaces which hold body heat. Adjust the number of layers to the temperature and activity. Loose-fitting clothing insures circulation and insulation.

D -- DAMPNESS – A wet garment is a cold garment. Wear the field jacket as a windbreaker and to repel water.

FIRST AID TREATMENT

Get off your feet, change to warm, dry clothing, and seek medical assistance. DO NOT RUB, AND DO NOT USE SNOW.

SEE REVERSE FOR CAUSE AND SYMPTOMS

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**APPENDIX C
SAMPLE WIND CHILL CARD**

HOW TO USE THE WIND CHILL CHART

Find the windspeed in the left-hand column, then read across to the column under the actual temperature. This number is the equivalent temperature which would be acting on any exposed skin. For example, if the wind is

blowing at 20 mph (32 kph) and the actual temperature is 10° F (-12° C), the effect on bare skin would be the same as a temperature reading of -25° F (-32° C) under calm conditions. Any movement has the same cooling effect as the wind. Running, skiing, or riding in an open vehicle must be considered in using the wind chill chart.

* GPO : 1983 0 - 417-503

The proponent for this regulation is the Office of the Deputy Chief of Staff for Training. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications) through channels to Cdr, TRADOC, ATTN: ATTG-I, Fort Monroe, VA 23651-5000.

FOR THE COMMANDER:

OFFICIAL:

RAYMOND E. HADDOCK
Major General, GS
Chief of Staff



THEODORE W. HUMMEL
Colonel, GS
Deputy Chief of Staff for
Information Management

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